Supplemental Figure 1: Production of C11-keto-*ent*-cassadiene by CYP76M7 in vitro. A) GC-MS chromatograph of assay extract (**1**, *ent*-cassadiene; **3**, C11-keto-*ent*-cassadiene). B) Mass spectra for **3** (C11-keto-*ent*-cassadiene).
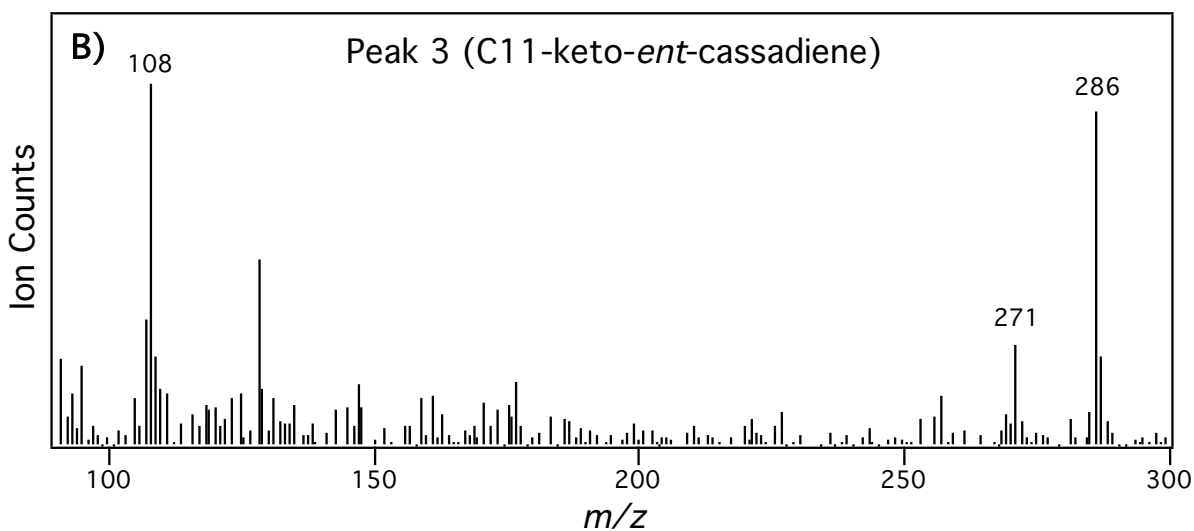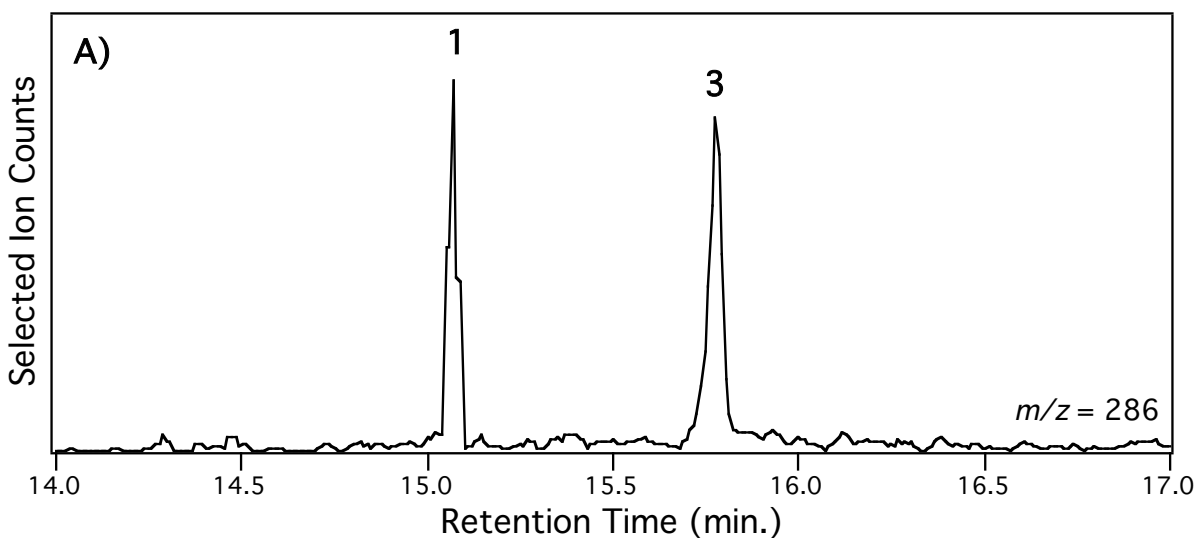
Supplemental Figure 2: Production of C11-keto-*ent*-cassadiene from C11α-hydroxyl-*ent*-cassadiene by recombinant bacteria expressing CYP76M7 and Os-CPR1. A) GC-MS chromatograph of fed culture extract (**2**, C11α-hydroxyl-*ent*-cassadiene; **3**, C11-keto-*ent*-cassadiene). B) Mass spectra for **3** (C11-keto-*ent*-cassadiene).
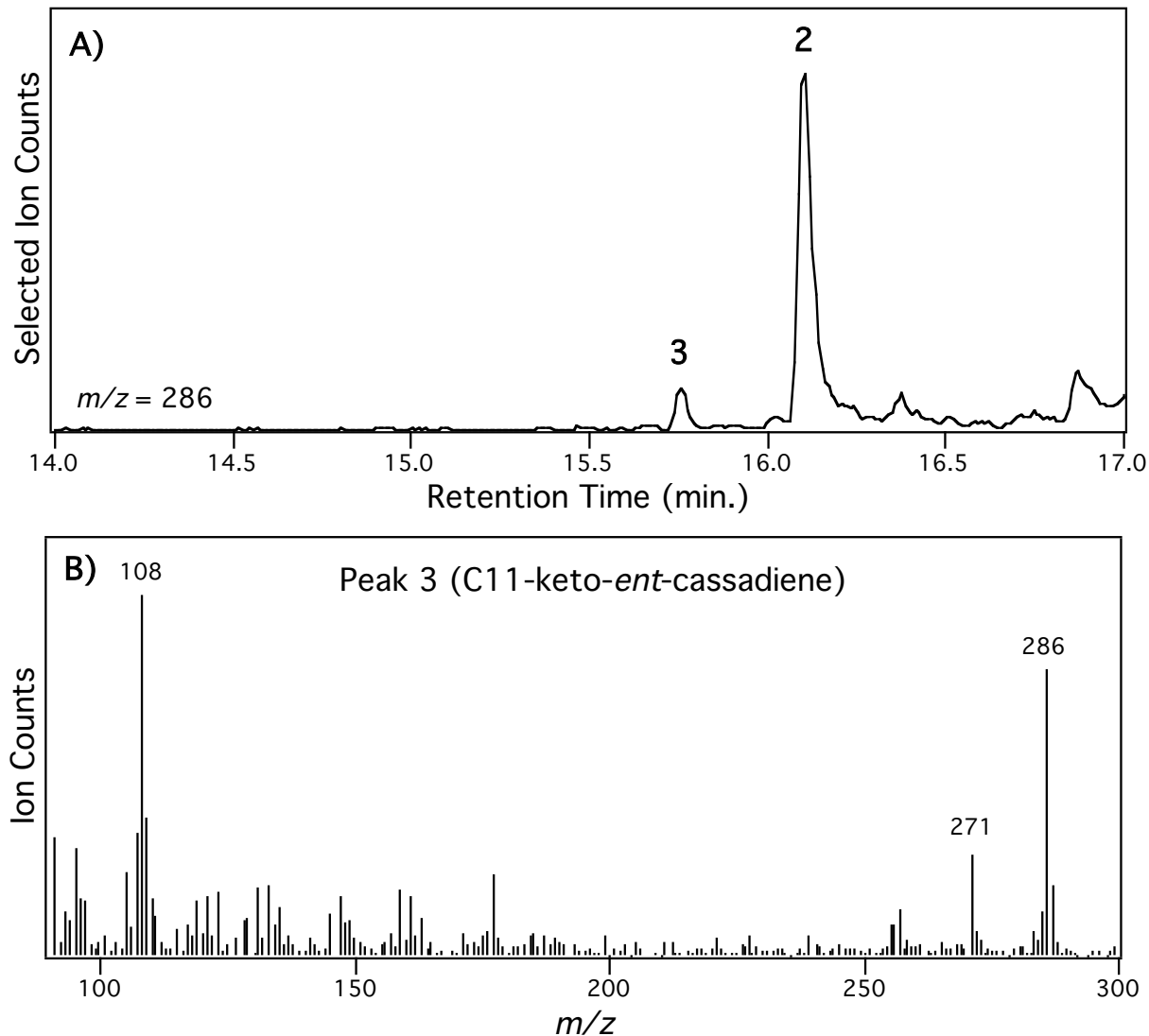
Supplemental Figure 3: Alignments used to generate the phylogenetic trees in Figure 6. A) Alignment of CPS used for phylogenetic tree in Figure 6A. B) Alignment of KSL used for phylogenetic tree in Figure 6B. C) Alignment of CYP used for phylogenetic tree in Figure 6C.

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                              20                    40                    60                    80
                              |                     |                     |                     |
Os-CPS1  ---MIH--LH SPP------- ---TAPAAFG GAGSADWRRR RRWSWSSSSR APVAKGGHLR PCVWRRGGDD GGGEDHHADS 65
Zm-CPS1  ---MPY--PH PYP------- ---WQSSR-- -------RRR RRRGRDGAPR QPQA-----R RVVER----- -------AAA 39
At-CPS   -MSLQYHVLN SIPSTTFLSS TKTTISSSFL TISGSPLNVA RDKSRSGSIH C--------- ---------- ---------- 50
Os-CPS2  MQMQVLTAAS SLPRATLL-R PAAA---E-- -----PWRQS ---FLQLQAR PIQRPGIML- ---------- ---------- 45
Os-CPS4  --MPVFTA-- SFQCVTLFGQ PASAADAQ-- -----PLLQG QRPFLHLHAR RRRPCGPML- ---------- ---------- 48

                              100                   120                   140                   160
                              |                     |                     |                     |
Os-CPS1  GGGGGGGAAW RARATTAGVS SSSSTAKGLQ ANIIEHETPR ITKWPNESRD LDDHQQNNEA DEEADDELQP LVEQVRSMLS 145
Zm-CPS1  GPG------- --HATTTQQP DNVSSAKVFQ TSRVETESK- -LRNGRKPQD LEDEHQAEEA ------ELQP LIDQVRAMLR 102
At-CPS   ---------- ---------- SKLRTQEYIN SQEVQHDLPL IHEW----QQ LQGEDAPQIS VGSNSNAFKE AVKSVKTILR 106
Os-CPS2  ---------- ---------- --HCKAQLQ- -GQETRERRQ LDDDEHARP- -------PQG GDDDVAASTS ------ELPY MIESIKSKLR 97
Os-CPS4  ---------- ---------- --ISKSPPYP ASEETREWEA EGQHEHT--- ---------- --DELRETTT ------T--- MIDGIRTALR 92

                              180                   200                   220                   240
                              |                     |                     |                     |
Os-CPS1  SMED--GAIT ASAYDTAWVA LVPRLDGEGG TQ--FPAAVR WIVGSQLADG SWGDEALFSA YDRVINTLAC VVALTRWSLH 221
Zm-CPS1  SMND--GDTS ASAYDTAWVA MVPKVGGDGG AQPQFPATVR WIVDHQLPDG SWGDSALFSA YDRMINTLAC VVALTKWSLE 180
At-CPS   NLTD--GEIT ISAYDTAWVA LIDA----GD KTPAFPSAVK WIAENQLSDG SWGDAYLFSY HDRLINTLAC VVALRSWNLF 180
Os-CPS2  AARNSLGETT VSAYDTAWIA LVNRLDGGGE RSPQFPEAID WIARNQLPDG SWGDAGMFIV QDRLINTLGC VVALATWGVH 177
Os-CPS4  SIGE--GEIS ISAYDTSLVA LLKRLDGGD- -GPQFPSTID WIVQNQLPDG SWGDASFFMM GDRIMSTLAC VVALKSWNIH 168

                              260                   280                   300                   320
                              |                     |                     |                     |
Os-CPS1  HDQCKQGLQF LNLNLWRLAE EEPDTMPIGF EIAFPSLVEA ARGLGI-DFP YDHPALKGIY ANRELKLKRI PKDMMHIVPT 300
Zm-CPS1  PARCEAGLSF LHENMWRLAE EEAESMPIGF EIAFPSLIQT ARDLGVVDFP YGHPALQSIY ANREVKLKRI PRDMMHRVPT 260
At-CPS   PHQCNKGITF FRENIGKLED ENDEHMPIGF EVAFPSLLEI ARGINI-DVP YDSPVLKDIY AKKELKLTRI PKEIMHKIPT 259
Os-CPS2  EEQRARGLAY IQDNLWRLGE DDEEWMMVGF EITFPVLLEK AKNLGL-DIN YDDPALQDIY AKRQLKLAKI PREALHARPT 256
Os-CPS4  TDKCERGLLF IQENMWRLAH EEEDWMLVGF EIALPSLLDM AKDLDL-DIP YDEPALKAIY AERERKLAKI PRDVLHAMPT 247

                              340                   360                   380                   400
                              |                     |                     |                     |
Os-CPS1  SILHSLEGMP GLDWQRLLKL QCSDGSFLFS PSATAYALMQ TGDKKCFAYI DRIIKKFDGG VPNVYPVDLF EHIWVVDRLE 380
Zm-CPS1  SILHSLEGMP DLDWPRLLNL QSCDGSFLFS PSATAYALMQ TGDKKCFEYI DRIVKKFNGG VPNVYPVDLF EHIWVVDRLE 340
At-CPS   TLLHSLEGMP DLDWEKLLKL QSGDGSFLFS PSSTAFAFMQ TRDSNCLEYL RNAVKRFNGG VPNVFPVDLF EHIWIVDRLQ 339
Os-CPS2  TLLHSLEGME NLDWERLLQF KCPAGSLHSS PAASAYALSE TGDKELLEYL ETAINNFDGG APCTYPVDNF DRLWSVDRLR 336
Os-CPS4  TLLHSLEGMV DLDWEKLLKL RCLDGSFHCS PASTATAFQQ TGDQKCFEYL DGIVKKFNGG VPCIYPLDVY ERLWAVDRLT 327

                              420                   440                   460                   480
                              |                     |                     |                     |
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Zm-CPS1  RLGISRYFQR EIEQCMDYVN RHWTEDGICW ARKSNVKDVD DTAMAFRLLR LHGYNVSPSV FKNFEKDGEF FCFVGQST-Q 419
At-CPS   RLGISRYFEE EIKECLDYVH RYWTDNGICW ARCSHVQDID DTAMAFRLLR QHGYQVSADV FKNFEKEGEF FCFVGQSN-Q 418
Os-CPS2  RLGISRYFTS EIEEYLEYAY RHLSPDGMSY GGLCPVKDID DTAMAFRLLR LHGYNVSSSV FNHFEKDGEY FCFAGQSS-Q 415
Os-CPS4  RLGISRHFTS EIEDCLDYIF RNWTPDGLAH TKNCPVKDID DTAMGFRLLR LYGYQVDPCV LKKFEKDGKF FCLHGESNPS 407

                              500                   520                   540                   560
                              |                     |                     |                     |
Os-CPS1  AVTGMYNLNR ASQISFPGED -ILQRARNFS YEFLREREAQ GTLHDKWIIS KDLPGEVQYT LDFPWYASLP RVEARTYIGQ 538
Zm-CPS1  AVTGMYNLNR ASQISFQGED -VLHRARVFS YEFLRQREEQ GMIRDKWIVA KDLPGEVQYT LDFPWYASLP RVEARTYLDQ 498
At-CPS   AVTGMFNLYR ASQLAFPREE -ILKNAKEFS YNYLLEKRER EELIDKWIIM KDLPGEIGFA LEIPWYASLP RVETRFYIDQ 497
Os-CPS2  SLTAMYNSYR ASQIVFPGDD DGLEQLRAYC RAFLEERRAT GNLMDKWVIA NGLPSEVEYA LDFPWKASLP RVETRVYLEQ 495
Os-CPS4  SVTPMYNTYR ASQLKFPGDD GVLGRAEVFC RSFLQDRRGS NRMKDKWAIA KDIPGEVEYA MDYPWKASLP RIETRLYLDQ 487

                              580                   600                   620                   640
                              |                     |                     |                     |
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Zm-CPS1  YGGKDDVWIG KTLYRMPLVN NDTYLELAIR DFNHCQALHQ LECNGLQTWY KDNCLDAFGV EPQ--DVLRS YFLAAACIFE 576
At-CPS   YGGENDVWIG KTLYRMPYVN NNGYLELAKQ DYNNCQAQHQ LEWDIFQKWY EENRLSEWGV RRS--ELLEC YYLAAATIFE 575
Os-CPS2  YGASEDAWIG KGLYRMTLVN NDLYLEAAKA DFTNFQRLSR LEWLSLKRWY IRNNLQAHGV TEQ--SVLRA YFLAAANIFE 573
Os-CPS4  YGGSGDVWIG KVLHRMTLFC NDLYLKAAKA DFSNFQKECR VELNGLRRWY LRSNLERFGG TDPQTTLMTS YFLASANIFE 567

                              660                   680                   700                   720
                              |                     |                     |                     |
Os-CPS1  PNRASERLAW ARVSVLANTI SRHFYSDMSS MK----RMER FMWSSLYEE- --NGNVLGLE GYAKDGILAR TLCQLIDLLS 689
Zm-CPS1  PSRAAERLAW ARTSMIANAI STHLRDISED KK----RLEC FV-HCLYEE- --N-DVSWLK RNPNDVILER ALRRLINLLA 647
At-CPS   SERSHERMVW AKSSVLVKAI SSSFGESSDS RRSFSDQFHE YIANARRSDH HFNDRNMRLD R-PGSVQASR LAGVLIGTLN 654
Os-CPS2  PNRAAERLGW ARTAILAEAI ASHLRQYSAN GAA-DGMTER LISGLASHDW DWRESKDSAA RS-----LLY ALDELIDLHA 647
Os-CPS4  PNRAAERLGW ARVALLADAV SSHFRR---- ---------- -IGG------ ---------P KN-----LTS NLEELISLVP 612

                              740                   760                   780                   800
                              |                     |                     |                     |
Os-CPS1  QETPPVREGQ -KCIHNLIRC AWIEWMMQ-Q INMKDGRYDK GRVMHPGSCT VHNKETCLLI AQIVEICAGR IEEAASMINN 767
Zm-CPS1  QEALPIHEGQ -RFIHSLLSL AWTEWMLQ-K ANKEENKYHK CSGIEP-QYM VHDRQTYLLL VQVIEICAGR IGEAVSMINN 724
At-CPS   QMSFDLFMSH GRDVNNLLYL SWGDWMEKWK LYGDEGEGE- ---------- ---------LM VKMIILMKNN -----DLTNF 710
Os-CPS2  ---------F GNA-SDSLRE AWKQWLMSWT --NESQGSTG G--------- ----DTALLL VRTIEICSGR HGSAEQSLKN 702
Os-CPS4  ---------F DDAYSGSLRE AWKQWLMAWT AKESSQESIE G--------- ----DTAILL VRAIEIFGGR HVLTGQR-PD 669

                              820                   840                   860                   880
                              |                     |                     |                     |
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Zm-CPS1  KDNDWFIQLT ---CATCDSL NHRMLLSQDT MKNEARINWI EKEIELNMQE LAQSLLLRCD EKTSNKKTKK TLWDVLRSLY 801
At-CPS   FTHTHFVRLA EIINRIC--L PRQYLKARRN DEKEKTIKSM EKEMG-KMVE LA------LS ESDTFRDVSI TFLDVAKAFY 781
Os-CPS2  SAD--YARLE QIASSMCSKL ATKIL-AQ-N GGSMDNVEGI DQEVDVEMKE LIQRVYGSSS -NDVSSVTRQ TFLDVVKSFC 777
Os-CPS4  LWE--YSQLE QLTSSICRKL YRRVL-AQEN GKSTEKVEEI DQQLDLEMQE LTRRVLQGCS -A-INRLTRE TFLHVVKSFC 744

                              900
                              |
Os-CPS1  YAANCSPHML DQHISEVIFE QVI 867
Zm-CPS1  YATHSPQHMI DRHVSRVIFE PV- 823
At-CPS   YFALCGDH-L QTHISKVLFQ KV- 802
Os-CPS2  YVAHCSPETI DGHISKVLFE DVN 800
Os-CPS4  YVAYCSPETI DNHIDKVIFQ DVI 767
```

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                            20                    40                    60                    80
                            |                     |                     |                     |
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Os-KSL6   MMLPMSSACS --------GG QFPGASPH-- ----GIIPKQ FSRAPRIRVS I--------- ---------- RG-AAGVEKS 46
Os-KSL8   MML-LSSSYS --------GG QFPGVSPL-- ----GTRPKR STTVVPRPVV T--------- ---------- RA--GGVRNN 44
Os-KSL11  MML-LSSSYS --------GG QFPGVSPL-- ----GTRPKR STTVVPLPVV T--------- ---------- RATAGGVRNN 46
Os-KSL10  -MLP-SSICS --------MG QIPRTSPH-- --YYGMLPKQ MSKGHP-PMV T--------- ---------- RAV-GGVEKG 45
Os-KS1    MMMLLLPSSS SSCCCRCPGG QFHGAPPR-- --VMAPRR-- --------GV T---RVYIEK -RL------- -GVGG----- 49
Os-KSL7   MMLLGSPSSG GY-----GG KFAGASPAGG TTTMAPSAKQ PSSRAPPPGI T---GGRNDL -RILSPAAAA AAVGGLEMKK 70
Os-KSL4   MASPMEAVAR SSLVLAPRRR RALGLLPAAA APFVLDCRRR HNGGMRRPHV SFACSAELDT GRRQLPSTGT RAVMSSCPGY 80
At-KS     MSINLRSSGC S--------- -----SPISA TLERGLDSEV QTRA------ ---------- ---------- ---------- 30

                            100                   120                   140                   160
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Os-KSL6   LGLGRNAGSQ QGMHKNELHD KIRKQLRDVQ LQPSSYDTAW VAMVPVQGSH Q--TPRFPQS IEWILQNQYD DGSWGTNL-P 123
Os-KSL8   LEVVGNAGTL QGMDIDELRV IVRKQLQGVE LSPSSYDTAW VAMVPVQGSR Q--SPCFPQC VEWILQNQQE DGSWGHSAGP 122
Os-KSL11  LEVVGNAGTL QGMDIDELRV IVRKQLQGVE LSPSSYDTAW VAMVPVQGSP Q--SPCFPQC VEWILQNQQE DGSWGHSAGP 124
Os-KSL10  -EVGGNVRSL QVMHSKELQA KIRRQLQGVE LSPSLYDTAW VAMVPERSSS Q--APCYPQC IEWILQNQHD DGSWGINSS- 121
Os-KS1    ----GNASSL QDMHRKELQA RTRDQLQTLE LSTSLYDTAW VAMVPLRGSR Q--HPCFPQC VEWILQNQQD DGSWGTR-GF 122
Os-KSL7   PEAEGIAESL QATHRKELEA SIRKQLQGVE LSPSPYDTAW VAMVPLRGSS H--NPSFPQC VDWILENQWD DGSWSID-GS 147
Os-KSL4   VEGRMVGENT SQINMGR-EA RIRRHLENPE FLPSSYDIAW VAMVPLPGTD HLQAPCFPEC VEWILQNQHS NGSWGVN-EF 158
At-KS     ---------- NNVSFEQTKE KIRKMLEKVE LSVSAYDTSW VAMVPSPSSQ N--APLFPQC VKWLLDNQHE DGSWGLDNHD 98

                            180                   200                   220                   240
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Os-KSL6   GLVVNKDILL CTLACVVALK RWNTGRDHIS RGPNFIGRNF SVAMDEQTVA PVGFNITFSG LLSLATRTGL ELPVMQTDID 203
Os-KSL8   SGEVNKDILL STLACVLALN IWNVGQDHIR RGLSFIGRNF SVAIDGQCAA PVGFNITFSG MLRLAIGMGL KFPVMETDID 202
Os-KSL11  SGEVNKDILL STLACVLALN TWNVGQDHIR RGLSFIGRNF SVAIDGQCAA PVGFNITFSG MLHLAIGMGL KFPVMETDID 204
Os-KSL10  SLSVNKDILL STLACVLALK KWNAGSYHIK RGLNFVGRNF SVAMDVQNIA PVGFNVTFSG LITLASGMGL QLPVWQTDID 201
Os-KS1    GVAVTRDVLS STLACVLALK RWNVGQEHIR RGLDFIGRNF SIAMDEQIAA PVGFNITFPG MLSLAMGMDL EFPVRQTDVD 202
Os-KSL7   ISTANKDVLS STLACVLALN KWNVGREHIR RGLSFIGRNF SIAMDDQAVA PIGFGITFPA MLTLANGSGL EVPVRQNDID 227
Os-KSL4   DSSASKDILL STLACIIALE KWNVGSEQIR RGLHFIAKNF SIVIDDQIAA PIGFNLTFPA MVNLAIKMGL EFPASEISID 238
At-KS     HQSLKKDVLS STLASILALK KWGIGERQIN KGLQFIELNS ALVTDETIQK PTGFDIIFPG MIKYARDLNL TIPLGSEVVD 178

                            260                   280                   300                   320
                            |                     |                     |                     |
Os-KSL5   GIFHMRKIEL ERDAYGTASS RRAFMAYVSE GLD-SLQDWD QVMAYQRKNR SIFNSPSATA ATVIHGHNDS ALCYLDSLVS 280
Os-KSL6   GIIHIRKIEL ERDAYGTASS RRAFMAYVSE GLG-NLQDWN QVMAYQRKNG SIFNSPSATA ATIIHGHNYS GLAYLDFVTS 282
Os-KSL8   SIFRLREVEF ERDAGGTASA RKAFMAYVSE GLG-REQDWD HVMAYQRKNG SLFNSPSTTA ASAIHSCNDR ALDYLVSLTS 281
Os-KSL11  SIFRLREVEF ERDAGGTASA RKAFMAYVSE GLG-REQDWD HVMAYQRKNG SLFNSPSTTA ASAIHSCNDR ALDYLVSLTS 283
Os-KSL10  EIFHLRKIEL ERDSGGTISA RKAFMAYVAE GFG-SLQDWD QVMAYQRKNG SLFNSPSTTA AAAIHTFNDR TLNYLDSLTN 280
Os-KS1    RLLHLREIEL EREAGDHSYG RKAYMAYVTE GLG-NLLEWD EIMMFQRKNG SFFNCPSSTA ATLVNHYNDK ALQYLNCLVS 291
Os-KSL7   SLNHLREMKI QREAGNHSRG RKAYMAYLAE GFG-NLLEWD EIMMFQRKNG SLFNCPSSTA GALANYHDDK ALQYLQSLVN 306
Os-KSL4   QILHLRDMEL KRLSGEESLG KEAYFAYIAE GLEESMVDWS EVMKFQGKNG SLFNSPAATA AALVHRYDDK ALGYLYSVVN 318
At-KS     DMIRKRDLDL KCDSEKFSKG REAYLAYVLE GT-RNLKDWD LIVKYQRKNG SLFDSPATTA AAFTQFGNDG CLRYLCSLLQ 257

                            340                   360                   380                   400
                            |                     |                     |                     |
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Os-KSL6   KFGGPVPVMY PQNAYSQLCM VDTLERMGIS ESFACEISDI LDMTYRLWMH NEEELMLDMR TCAMAFRLLR MHGYDITSDG 362
Os-KSL8   KLGGPVPAIY PDKVYSQLCM VDTLEKMGIS SDFACDIRDI LDMTYSCWMQ DEEEIMLDMA TCAKAFRLLR MHGYDVSSEG 361
Os-KSL11  KLGGPVPAIH PDKVYSQLCM VDTLEKMGIS SDFACDIRDI LDMTYSCWMQ DEEEIMLDMA TCAKAFRLLR MHGYDVSSEG 363
Os-KSL10  KFGGPVPAMY PQNIYSQLCT VDALERTGIS QKFAREIRDI LDTTYRSWLH NEEEVMLDIP TCAMAFRLLR THGYDITSDE 360
Os-KS1    KFGSAVPTVY PLNIYCQLSW VDALEKMGIS QYFVSEIKSI LDTTYVSWLE RDEEIMLDIT TCAMAFRLLR MNGYHVSSVE 361
Os-KSL7   KFDGVVPTLY PLNIYCQLSM VDALENMGIS QYFASEIKSI LDMTYSSWLG KDEEIMLDVT TCAMAFRLLR MNGYDVSSDE 386
Os-KSL4   KFGGEVPTVY PLNIFSQLSM VDTLVNIGIS RHFSSDIKRI LDKTYILWSQ RDEEVMLDLP TCAMAFRLLR MNGYGVSSDD 398
At-KS     KFEAAVPSVY PFDQYARLSI IVTLESLGID RDFKTEIKSI LDETYRYWLR GDEEICLDLA TCALAFRLLL AHGYDVSYDP 337

                            420                   440                   460                   480
                            |                     |                     |                     |
Os-KSL5   MAQFVEQSSF DDSIHGYLND TKALLELYRS SQIRCLEDDL ILQDIGSWSA -RVLQEKISS ---KMTHKS- EMLGVEYALK 435
Os-KSL6   MAQFVEQSSF DDSIHGYLND TKALLELYKS SQLRCLEDDL ILEEIGSWSA -RVLLEKISS ---KMIHIS- ELPEVEYALK 437
Os-KSL8   MARFAERSSF DDSIHAYLND TKPLLELYKS SQVHFLEEDF ILENIGSWSA -KLLKQQLSF ---NKISKS- LMPEVEYALK 436
Os-KSL11  MARFAERSSF DDSIHAYLND TKPLLELYKS SQLHFLEEDL ILENISSWSA -KLLKQQLSS ---NKIMKS- LMPEVEYALK 438
Os-KSL10  MAHFSEQSSF DDSIHGYLND TKTLLELFKT SQIRFSCEDL VLENIGTWSA -KLLKQQLLS ---NKLSTS- AQSEVEYVLK 435
Os-KS1    LSPVAEASSF RESLQGYLND KKSLIELYKA SKVSKSENES ILDSIGSWSG -SLLKESVCS ---NGVKKAP IFEEMKYALK 437
Os-KSL7   LSHVAGASGF RDSLQGYLND RKSVLEVYKT SKHSISENDL ILDSIGSWSG GSLLKEMLSS ---NG-KGTP GREEIEFALK 462
Os-KSL4   LSHVAEASTF HNSVEGYLDD TKSLLELYKA SKVSLSENEP ILEKMGCWSG -SLLKEKLCS ---DDIRGTP ILGEVEYALK 474
At-KS     LKPFAEESGF SDTLEGYVKN TFSVLELFKA AQSY--PHES ALKKQCCWT- KQYLEMELSS WVKTSVRDKY LKKEVEDALA 414

                            500                   520                   540                   560
                            |                     |                     |                     |
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Os-KSL6   CPVYAILERL EQKRNIEQFK TKEQLKIEGF KLLKSGY-RG VIPNDEILAL AVDEFHSSQS VYQQELQDLN SWVAHTRLDE 516
Os-KSL8   YPFYATVEVL EHKGNIERFN ------VNGF QRLKSGY-CG SGADKEILAL AVNKFHYAQS VYQQELRYLE SWVAEFRLDE 509
Os-KSL11  YPLYSTVDAL EHRGNIERFN ------VNGF QRPKSGY-CG SGADKEILAL AVDKFHYNQS VYQQELRYLE SWVAEFGLDE 511
Os-KSL10  FPLHSTLDRL EHRRNIEQFK ------VEGS KVLKSGY-CG SHSNEEILAL AVDYFHSSQS VYQQELKYFE SWVKQCRLDE 508
Os-KS1    FPFYTTLDRL DHKRNIERFD ------AKDS QMLKTEY-LL PHANQDIIAL AVEDFSSQGS IYQDELNYLE CWVKDEKLDQ 510
Os-KSL7   YPFYSTLERL VHRKNIVLFD ------AKGS QMLKTAC-MP VHDSQDFLAL AVDDFCISQS NYQNELNYLE SWVKDNRLDQ 535
Os-KSL4   FPFYATLEPL DHKWNIENFD ------ARAY QKIKTKN-MP CHVNEDLLAL AAEDFSFCQS TYQNEIQHLE SWEKENKLDQ 547
At-KS     FPSYASLERS DHRRKILNGS A-----VENT RVTKTSYRLH NICTSDILKL AVDDFNFCQS IHREEMERLD RWIVENRLQE 489

                            580                   600                   620                   640
                            |                     |                     |                     |
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Os-KSL6   LKFARLMPSI TYFSAAAVLL PSE--SARIA WTQNCILTTT VDDFFD-GEG SKEEMENLVK LIEKWDDHGE IGFSSECVEI 593
Os-KSL8   LKFARVIPLQ SLLSAVVPLF PCELSDARIA WSQNAILTAV VDDLFD-GGG SMEEMLNLVA LFDKWDDHGE IGFCSSNVEI 588
Os-KSL11  LKFARVIPLQ SLLSALVPLF PAELSDARIA FSQNCMLTTM VDDFFD-GGG SMEEMVNFVA LIDEWDNHGE IGFCSNNVEI 590
Os-KSL10  LKFARVMPLI VHFSSAATIF APELADARMV LSQTCMLITV YDDFFDCPEI SREEKENYIA LIEKWDNHAE IGFCSKNVEI 588
Os-KS1    LPFARQKLTY CYLSAAATIF PRELSEARIA WAKNGVLTTV VDDFFDLG-G SKEELENLIA LVEKWDGH-Q EEFYSEQVRI 588
Os-KSL7   LHFARQKITY CYLSGAATTF RPEMGYARTS WARTAWLTAV IDDLFDVG-G LEQEQENLLA LMEKWEEPGE DEYYSEDVKI 614
Os-KSL4   LEFTRKNLIN SYLSAAATIS PYELSDARIA CAKSIALTLV ADDFFDVG-S SKEEQENLIS LVEKWDQYHK VEFYSENVKA 626
At-KS     LKFARQKLAY CYFSGAATLF SPELSDARIS WAKGGVLTTV VDDFFDVG-G SKEELENLIH LVEKWDLNGV PEYSSEHVEI 568
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                     660              680              700              720
                      |                |                |                |
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 Os-KSL6  LFYAVYNTSK QIAEKAMPLQ KRNAVDHIAE SWWFTVRGML TEAEWRMDKY VPTTVEEYMS AAVDSFAVGP IITSAALFVG 673
 Os-KSL8  MFNAVYNTTK RIGAKAALVQ KRCVIDHIAE QWQVMVRAML TEAEWAAGKH IPATMGEYMS VAEPSFALGP IVPVSAYLLG 668
 Os-KSL11 MFNAIYNTTK RNCAKAALVQ NRCVMDHIAK QWQVMVRAMK TEAEWAASRH IPATMEEYMS VGEPSFALGP IVPLSAYLLG 670
 Os-KSL10 VFYAVYNTYK QIGEKAALKQ NRSIMDQLVE DLVSSAKAMM VEADWTATKY IPATMEEYMS NAEVSGAFAS FVCPPLYFLG 668
 Os-KS1   VFSAIYTTVN QLGAKASALQ GRDVTKHLTE IWLCLMRSMM TEAEWQRTKY VP-TMEEYMA NAVVSFALGP IVLPTLYFVG 667
 Os-KSL7  VFQALYNTVN EIGAKASALQ GHDVTKYLVD VWLHVVRCMK VEAEWQRSQH LP-TFEEYME SGMVSLGQGC TVMSALFLIG 693
 Os-KSL4  VFFALYSTVN QLGAMASAVQ NRDVTKYNVE SWLDYLRSLA TDAEWQRSKY VP-TMEEYMK NSIVTFALGP TILIALYFMG 705
 At-KS    IFSVLRDTIL ETGDKAFTYQ GRNVTHHIVK IWLDLLKSML REAEWSSDKS TP-SLEDYME NAYISFALGP IVLPATYLIG 647

                     740              760              780              800
                      |                |                |                |
 Os-KSL5  PELSEEVFRS EEYIHLMNLA NTIGRLLNDM QTYEKEIKMG KV-NSI-MLH ALSHSG---- GGRGSPE--- -ASMEEAKRE 743
 Os-KSL6  PELSEEVFRS EEYIHLMNLA NTIGRLLNDM QTYEKEIKMG KV-NSV-MLH ALSHSG---- GGRGSPE--- -ASMEEAKRE 743
 Os-KSL8  EELPEEAVRS PEYGRLLGLA SAVGRLLNDV MTYEKEMGTG KL-NSVVLLQ PLAAGGAASR GGGGAPAP-A PASVEAARAE 746
 Os-KSL11 EELPEEAVRS PEYGQLLRHA SAVGRLLNDV MTYEKEVLTW TP-NSV-LLQ ALAA----AR GGGESPTPPS PACAEAARGE 744
 Os-KSL10 LKLSEEDVKS HEYTQLLKLT NVIGRLQNDS QTYRKEILAG KV-NSV-LLR ALTDS----- -GNTSPE--- --SIEAAKEI 735
 Os-KS1   PKLQEDVVRD HEYNELFRLM STCGRLLNDS QGFERESLEG KL-NSVSLLV HHSGGSI--- ---------- --SIDEAKMK 731
 Os-KSL7  EKLPEGIVEL EEYDELFRLM GTCGRLLNDI RGIEREESDG KMTNGVSLLV HASGGSM--- ---------- --SVDEAKTE 758
 Os-KSL4  QNLWEDIVKN AEYDELFRLM NTCGRLQNDI QSFERECKDG KL-NSVSLLV LDSKDVM--- ---------- --SVEEAKEA 769
 At-KS    PPLPEKTVDS HQYNQLYKLV STMGRLLNDI QGFKRESAEG KL-NAVSLHM KHERDN---- ---------- -RSKEVIIES 711

                     820              840              860              880
                      |                |                |                |
 Os-KSL5  MRRVLQGSRC DLLRLVTRDG G-----VVPP PCRKLFWFMS KVLHFVYMEK DGYFTADGMM ASANAVILDP LQVTLLPSGL 818
 Os-KSL6  MRRVLQGCRF ELLGLVTRDA G-----VVPP PCRKLFWLMS KVLHFVYMEK DRYFTAEGMM ASANAVILDP LQVTLPPSDS 818
 Os-KSL8  VRRAIQASWR DLHGLVFGSG GGSSSSIIPR PCREVFWHTG KVASVFYQEG DGY-ARKAMR SMANAVILEP LHLQE----- 820
 Os-KSL11 VRRAIQASWR DLHRLVFRDD DGSS--IVPR ACRELFWGTA KVANVFYQEV DGY-TPKAMR GMANAVILDP LHLQE----- 816
 Os-KSL10 VNRDAESSMV EMRSLVFSEG GP-----IPR PCKDRFWEMC KIVFYFYSED DAYRTPKETM SSARAVILDP LRLIPPPSCP 810
 Os-KS1   AQKSIDTSRR NLLRLVLGEQ -G----AVPR PCKQLFWKMC KIVHMFYSRT DGFSSPKEMV SAVNAVVKEP LKLKVSDPYG 806
 Os-KSL7  VMKRIDASRR KLLSLVVSEQ EG----PIPR PCKQLFWKMC KILHLFYYQT DGFSSPKEMV SAVDAVINEP LQLRLL---- 830
 Os-KSL4  INESISSCRR ELLRLVVRED -G----VIPK SCKEMFWNLY KTSHVFYSQA DGFSSPKEMM GAMNGVIFEP LKTRGN---- 840
 At-KS    MKGLAERKRE ELHKLVLEEK G----SVVPR ECKEAFLKMS KVLNLFYRKD DGF-TSNDLM SLVKSVIYEP VSLQKESLT- 785


 Os-KSL5  GTL--- 821
 Os-KSL6  GTL--- 821
 Os-KSL8  ------ 820
 Os-KSL11 ------ 816
 Os-KSL10 ETLSS- 815
 Os-KS1   SILSGN 812
 Os-KSL7  ------ 830
 Os-KSL4  ------ 840
 At-KS    ------ 785
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                          20                  40                  60                  80
                          |                   |                   |                   |
CYP71Z3  --MDDKLLQL LLLALAVSVV SIVTISKL-- -------VYR ATNKPRLNLP PGPWTLPVIG SLHHLVM-RS PSI-HRSMRA 67
CYP71Z4  --MEDKL-PL ALTVLSVSVL IAVVISKL-- -------VSY AT-KPRLNLP PGPWKLPVIG SLHHLV--GS HAI-HRSMRA 64
CYP71Z8  --MEDKL--L LLLALAVSVL VAVVISKL-- -------VSY AT-KPRLNLP PGPWTLPVIG SIHHLV--GS HPI-HRSMRA 63
CYP71Z6  --MED-K--- LILDLCLSAL FVVVLSKL-- -------VSS AM-KPRLNLP PGPWTLPLIG SLHHLVMTKS PQT-HRSLRA 63
CYP71Z7  --MEDNK--- LILALGLSVL FVL-LSKL-- -------VSS AM-KPRLNLP PGPWTLPLIG SLHHLVM-KS PQI-HRSLRA 62
CYP71Z5  --MEDKT--- ILLSLALSML LAILLSKL-- -------VSI SK-KPRLNLP PGPWTLPVIG SIHHLA--SN PNT-HRALRA 62
CYP71Z1  ---------- ----MGASIL LVVVVSKL-- -------MIS FAAKPRLNLP PGPWTLPLIG SIHHVV-SSR ESV-HSAMRR 55
CYP71Z2  --MEDK---- VLLAVGASLV LVFL-SKL-- --------ISS YAKKPRLNLP PGPWTLPLIG SAHHLV-SWS ESV-HSVIGK 62
CYP71W1  --ME--LTTL LLLALISFFF LVELIARY-- -------ASP SGRESALRLP PGPSQLPLIG SLHHLLLSRY GDLPHRAMRE 67
CYP99A2  --ME--INSA ATLTLVSLLT LPILLALL-- --------TRK SSSKKRR--P PGPWNLPLVG GLLHLLRSH- ---PQVALRE 61
CYP99A3  -MME--INSE ATVTLVSVVT LPILLALL-- --------TRK SSSKKRR--P PGPWNLPLVG GLLHLLRSQ- ---PQVALRD 62
CYP71B13 ---------- -MSLWYIIVV FVFFASIF-- --------IAK NTRKTKKNLP PGPPRLPIIG NLHQL----- GSKPHRSMFK 55
CYP76M2  --ME---RDA WLLCAALAAA TVVVY---L- ----ACTTSR R--AQRRRLP PGPTPLPVIG NVLSL----R G-NMHHALAR 60
CYP76M10 --ME---REA WLLCAALAAA MVYYYYYYL- ----ACTT-R R--AQRR-LP PGPTPLPVIG NVLSL----S G-DMHHELAR 61
CYP76M5  --MET--REL WVLAAALAVS LLYYLAALMR YAGGGCS--- R--SSRPPLP PGPTPLPLIG NLLSL----R G-VLHHRLAS 66
CYP76M9  ---MG--HEL WVLWATLAVS LLCYLY---- ------LTSH RLGSRRRRWP PGPRPLPLLG NLLDL----R GGNLHHTLAR 61
CYP76M6  --MEKLKSEL WMTAVATCMS LLLYLTILRR R--------H ASGGRSLALP PGPTPLPLIG NLLCL----- GGIFHQTLAK 65
CYP76M1  ----MDVNQL WLLWATLAVS LLYYI----- ------SNRR RRVGGRRRCP PGPMPLPLVG NLLNL----R G-HLPPALAR 60
CYP76M7  ---ME-NSQV WLLWGALSVA VLFYLSTLRR RY-------- --AGGKP-LP PGPTPLPLIG NLHLA----G G-TFHHKLRD 60
CYP76M8  ---ME-NSQM WLLWGALSVA LFFYFSTLRR RY-------- --AGGKP-LP PGPTPLPLIG NLHLV----G GGTFHHKLRD 61
CYP71M14 ---MEKSSEL WLLWAVFSAS LVFLYLTIRR RS-------G AGAGGKPPLP PGPTPLGLIG NLLDL----R GGVIHDKLAA 66
CYP76M13 -----MASGL WFLGISLAVL LLCYV----- ------GTNR RGDGQR---P PGPRTLPIVG NLLDL----R GGNLHHKLAS 57
CYP76L1  ---MEASTIL WLLYVSLASC LLYKVFVSTK NGHPKIAARR ---------P PGPTPVLLLG NVFDL----R G-ELHLALAR 63
CYP76C2  MDIIFEQALF PLFCFVLSFF IIFFT----- ------TTRP RSSRKVVPSP PGPPRLPIIG NIH-L----V GRNPHHSFAD 64
CYP701A6 ---------M EAFVPGGAGA AAAAVGGFVA AAALAERAGV IAPRKRPNAP PAVPGLPIIG NLHQL----K EKKPHQTFAK 67

                          100                 120                 140                 160
                          |                   |                   |                   |
CYP71Z3  LAEK-HGP-- LMQVWLGEVP AVVVSSTEAA EEVLKNQDAR FADRFITTTL GAITFGGGDL AFAPYGE-RW RHLKMLCTQQ 143
CYP71Z4  LAEK-HGRHH LMQISLGEVF AVVVSSPEAA EEILRNQDVT FADRFLSTTI GVITFGGNDM AFAPYGE-RW RQLRKLCTLE 142
CYP71Z8  LAEK-HGRD- LMQVWLGELP AVVVSSPEAA RDVLRSQDLA FADRYVSTTI AAIYLGGRDL AFAPYGE-RW RQLRKLCTQR 140
CYP71Z6  LSEK-HGP-- IMQLWMGEVP AVVVSSPAVA EEVLKHQDLR FADRHLTATT EEVFFGGRDV IFGPYSE-RW RHLRKICMQE 139
CYP71Z7  LSEK-HGP-- IMQLWMGEVP AVIVSSPAVA EEVLKHQDLR FADRHLTATI EEVSFGGRDV TFAPYSE-RW RHLRKICMQE 138
CYP71Z5  LSQK-HGP-- LMQLWLGEVP AVVASTPEAA REILRNQDLR FADRHVTSTV ATVSFDASDI FFSPYGE-RW RQLRKLCTQE 138
CYP71Z1  LARR-HGA-P LMQLWFGEVG TVVASSPEAA REVLRSHDLA FADRHLTAAA AAFSFGGRDV VLSPYGE-RW RQLRKLLTQE 132
CYP71Z2  LARE-HG--P VMQLWLGEVP TVVASSPEAA QEILRDHDLI FADRHLTSTT AAITFGGTDV VMAQYGE-RW RHLRKLLTQE 138
CYP71W1  LSLT-YGP-- LMLLRLGAVP TLVVSSAEAA AEVMRAHDAA FAGRHLSATI DILSCGGKDI IFGPYTE-RW RELRKVCALE 143
CYP99A2  LASK-YGP-- VMFLRMGQID TVVVSSPAAA QEVLRDKDVM FASRPSLLVS EIFCYDNLDV GFAPYGA-YW RMLRKLCTVE 137
CYP99A3  LAGK-YGP-- VMFLRTGQVD TVVISSPAAA QEVLRDKDVT FASRPSLLVS EIFCYGNLDI GFAPYGA-YW RMLRKLCTVE 138
CYP71B13 LSEK-YGP-- LVYLKLGKVP SVVASTPETV KDVLKTFDKD CCSRAFLTYP ARISYNLKDL AFAPYSK-YW KAVRKMTVVE 131
CYP76M2  LARERYGP-- VMALKLGLVT AVVVSSPDAA REAFTKHDRR LAARAVPDTS RVRGFADRSM IWLPSSDTRW KTLRGVVATH 138
CYP76M10 LAREQYGP-- VMTLKLGLFT AVVVSSPDAA REAFTKHDRR LAARTVPDIS RARGLTGRSM IWLPSSDPRW KTLRSAVATH 139
CYP76M5  LARV-HGP-- VMALRLGLTT AVVVSSRDAA AEAFTKHDRR LAARVVPDSN RAHGFSDRSI IWLPSSDPRW KALRGIQATH 143
CYP76M9  LARAHGAP-- VMRLQLGLSP AVVISSPGAA REAFTAHDRR LAARAVPDAN HALGFCDRSM IWLPSADPMW RTLRGVVAAH 139
CYP76M6  LARV-HGP-- VMTLKLGLTT AVVVSSAEAA REAYTKHDQR LAARPVPDAF RANGFSERSI VFSPSSDPQW KNLRGIHATH 142
CYP76M1  LART-YGP-- VMMLKMGLTT TVVVSSGDAA REAFTKHDRH LAARTVLDVT RSLDFADRSM IWLPSSDTVW KTLRGVTAAS 137
CYP76M7  LARV-HGP-- VMTLKLGLAT NVVISSREAA IEAYTKYDRH LAARATPDTF RACGFADRSM VFIPSSDPQW KALRGIQGSH 137
CYP76M8  LARV-HGP-- VMTLKLGLAT NVVISSREAA IEAYTKYDRH LAARATPDTF RACGFADRSM VFIPSSDPQW KALRGIHASH 138
CYP71M14 LARV-YGP-- VMMIKLGLND AVIISSRDAA REAFTRYDRH LAARAIPDTF RANGFHERSA VFLPSSDERW KALRGIQGTH 143
CYP76M13 LAHA-HGP-- VMTLKLGLVT TVFISSRDAA WEAFAKHDRR LAARTVPDTR RALAHAERSM VWLPSYDPLW KTLRSIAVTH 134
CYP76L1  LAEE-HGP-- VMSLKLGTAT AVVASSAAAA RDALQRYDHV LAARAVCDAA RALGTHERSI VWLPGSSALW KRLRAVCTNH 140
CYP76C2  LSKT-YGP-- IMSLKFGSLN TVVVTSPEAA REVLRTYDQI LSSRTPTNSI RSINHDKVSV VWLPPSSSRW RLLRKLSATQ 141
CYP701A6 WAEI-YGP-- IYTIRTGASS VVVLNSTEVA KEAMVAKFSS ISTRKLSKAL TVLTRDKSMV ATSDYCDFH- KMVKRYVMSS 143

                          180                 200                 220                 240
                          |                   |                   |                   |
CYP71Z3  LLTAARVRSF RRIREEEVAR LVRDLAASA- ---AGGGEVA VNLSERVARL -VNDIMVRCC VGGR----S- KHRDE--FLG 211
CYP71Z4  LLSAARVRSF RRIREEEVAR LVRDLAASA- ---AAGE--A VNLSGRIAKL -INDVVVRCC VGGR----S- EHRDE--FLD 208
CYP71Z8  LLTAARVRSF RCVREEEVAR LVRDLAASA- ---AAGE--A VDLTARVAEL -VNDVVVRCC IGGRR---S- RYRDE--FLD 207
CYP71Z6  LLTAARVRSF QGVREREVAR LVRELAADA- ---GAGGDAG VNLNERISKL -ANDIVMVSS VGGRC---S- -HRDE--FLD 207
CYP71Z7  LLTAARVRSF QGVREREVAR LVRELAADA- ---GAGGDAG VNLNERISKL -ANDIVMVSS VGGRC---S- -HRDE--FLD 206
CYP71Z5  LLTATRVRSF SRVREDEVAR LVRELA---- ----GGGGAA VDLTERLGRL -VNDVVMRCS VGGRC----- RYRDE--FLG 202
CYP71Z1  LLTASRVRSF RRVREEEVAR LMRDLSAAA- ---TAG--AA VNLSEMVTRM -VNDTVLRCS VGSRC----- EHSGE--YLA 198
CYP71Z2  LLTVARVRSF RRVREEEVAR LVRDLSAAA- ---ASG--AT VNLTDMVNRL -VNDTVLRCS VGSRC----- KYREE--FLA 204
CYP71W1  LFNHRRVLSF RPVREDEVGR LLRSVSAAS- ---AEGGAAC FNLSERICRM -TNDSVVRAA FGARC---D- -HRDE--FLH 211
CYP99A2  LLSTKVVRQL APVRNDETLT LVRNIKAASS GHGGGGGKKP VTLARLLTTC -TNTITAKAA FGQAC---GV ELQEQ--FLT 211
CYP99A3  LLSTKMVRQL APIRDGETLA LVRNIEAAA- -----GGKKP FTLATLLISC -TNTFTAKAA FGQAC---GG ELQEQ--FLT 206
CYP71B13 LYTAKRVKSF RNIREEEVAS FVEFIKHSAS L------EEI VNLNQTLVKL -SGSVICRVG FGINLE--GS KLENT--YEE 200
CYP76M2  VFSPRSIAAA RGVRERKVRD IVGYFAAHV- --GEV----- VDVGEAVYSG -VVNLVSNAF FSGDVVDVGE ESAHG--LRE 207
CYP76M10 FFSPRSLAAA RGVRERKVRD IVNYFAGHA- --AEV----- IDVGEAVYGG -VINIVSNAF FSADVVDVGK ESAHG--LRE 208
CYP76M5  LFSPRGLAAV RSVRESKVRD IVAYFRSRA- --GEE----- VVFGEAIYSG -VLNLVSSSF FSVNMAGVGS EEAHG--LRE 212
CYP76M9  AFSPRALAAA RAVHERKVRD LVAYLRGRA- --GRE----- VDVKDAVYGG -VLNLVSSAL FSADVVDVGG ESAQG--FRE 208
CYP76M6  IFSPRALAAL RGIRERKVRD IVGYIRTVA- --GEE----- MCVREVVHNG -VLNLISTSF FSMDMADVRS ESARG--LRG 211
CYP76M1  IFSPRGLAAL RGVRESKVRD LVGYFRGRA- --GEV----- VDVRHAVYGC -MLSLVSSAF FSVDVVDLSA ESENE--FRQ 206
CYP76M7  VFTPRGLAAV RPIRERKVGD LIAYLRAHA- --GEE----- VLLGQAMYTG -LLNLVSFSY FSIDIVDMGS QMARD--LRE 206
CYP76M8  VFTPRVLAAV RPIRERKVGD LIAYLRAHA- --GEE----- VLVGHAMYTG -ILNMVSFSY FSVDIVDMGS QMARE--LRE 207
CYP71M14 IFTPRGLAAV RPVRERKVRD IIAYFRDHA- --GEE----- LVIRQAIHTG -VLNLVSSSF FSMDIAGMGS ETARE--LRE 212
CYP76M13 VFSPRSLGVA RSARERKVHD MVDSFRRRA- --GQE----- VDIGQVLYHG -MFDLLANVL LSVD------ -AHPN--LRD 196
CYP76L1  LFSARGLDAT RAVREAKVRE LVEHLRGHAA GAGEEE-AAA VDVGRVVFSA -VINLVSNVL FSEDVADLSS DRAQE--LEM 216
CYP76C2  LFSPQRIEAT KTLRENKVKE LVSFMSE--- --SSER-EEA VDISRATFIT -ALNIISNIL FSVDLGNYDS NKSGV--FQD 212
CYP701A6 MLGTSAQKQF RDIRDMMIHN MLSTFHKLVK DDPHAPLIFR DVFKDELFRL SMIQSLGEDV SSVYVDEFGR DISKEEIYNA 223
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                    260             280             300             320
                     |               |               |               |
CYP71Z3   ALCTALSQTS WLTVADLFPS -SRLARMLGT APPRRALASRK KMELILEQII QEREEMTTDR S-----G-DG EAGPT-NECF 283
CYP71Z4   ALRTALDQTT WLTVADVFPS -SKLARMLGT APRKALASRK KIEHILEQII QERKRIM-DR SSHGGDG-DG EAMNT-SECF 284
CYP71Z8   ALRTALDQTT WLTVADVFPS -SKLARMLGT APRKALASRK KMERILEQII QERKQIK-ER STGAGAGADD EAAAAGNECF 285
CYP71Z6   ALEVAKKQIT WLSVADLFPS -SKLARMVAV APRKGLASRK RMELVIRRII QERKDQLMDD SAAGA----G EAA-AGKDCF 281
CYP71Z7   ALEVAKKQIT WLSVADLFPS -SKLARMVAV APRKGLASRK RMELVIRRII QERKDQLMDD SAAGA----G EAA-AGKDCF 280
CYP71Z5   ALHEAKNQLT WLTVADLFPS -SRLARMLGA APRRGLASRK RIERIIADIV REHEGYM--- GSGGDGGGDEA AAAAAGKDCF 278
CYP71Z1   ALHAVVRLTS GLSVADLFPS -SRLAAMVSA APRAAIANRD KMVRIIEQII RERKAQIEAD ---------D RAA-DSKSCA 267
CYP71Z2   ALHAILHQTS ALSVADLFPS -SKLASMVAT GPRNVLANRN KVERIIEEII QERKNQIETD MMSGNDDVGD KAAVESKSC- 282
CYP71W1   ELDKAVRLTG GINLADLYPS -SRLVRRLSA ATRDMARCQR NIYRIAESII RDR------- ---------D GAPPPERDEE 274
CYP99A2   ALDVGLKFSG GFCFGDLFPS -LRFIDAMTG LRSRLWRARG QLDSVFDKII AQCEEHQGD- ---------- ---------- 269
CYP99A3   ALDEALKFSN GFCFGDLFPS -LRFIDAMTG LRSRLERLRL QLDTVFDKIV AQCESNPGD- ---------- ---------- 264
CYP71B13  VIHGTMEVLG SFAASDYFPV IGGIIDRITG LHNKCEKVFK GTDSFFDHCI KHHLE----- ---------- ----DGGSKD 261
CYP76M2   AVEDIILAIA KPNVSDLFPF LRPLD--LQG WRRWAEKRYD TVFDILDNIT NSRLAD---- -----ASAGN HA-------G 269
CYP76M10  TLEDIILAIA KPNVSDLFPF LRRLD--LQG WRRWAEKRYD KVFGILDDKI NSRLAD---- -----ADADA STKKH----G 273
CYP76M5   LVEDLVEAIA KPNVSDLFPF LRQLD--LQG LRRRTEERMA RAFGILDGII DRRRLAN--- ------RT--- HGDRH----G 274
CYP76M9   LVEELIESIA KPNVSDLFPF LRRFD--LQG WRRWTSGHLA KIYKVLDDII DRRRTAE--- -----DDA-- AMDKR----G 271
CYP76M6   LIEDIIATVA GPNVSDFFPF LRQLD--LQG LRRQTGSHLG IVFGLLDDII DRRMAE---- -----TRDHP DKQRH----G 276
CYP76M1   SMTFLMEVVS KTNVSDFFPF LRPLD--LQG WRRLTERYLG RVTCFLDDVI DRRRFA---- --------ADA SANRH----G 268
CYP76M7   VVDDIISVVG KPNISDFYPF LRPLD--LQG LRRWTTKRFN RVFSIMGDII DRRL------ -----AHIRD GKPRHD---- 269
CYP76M8   VVDDIIILVVG KPNVSDFYPF LRPLD--LQG LRRWTTKRFN RVFSIMGDII DRRL------ -----AHIRD NKPRHD---- 270
CYP71M14  HVDEIMTVFA QPNVSDYFPF LRRLD--LQG LRRSTKRRFD RIFSILDDIV ERRLVDRGER GGEGGASSNS SKSKHQYDGG 290
CYP76M13  LMEDIVAILA KPNASDFFPL LRPLD--LQG IRHWTAIHMS RVLHILDSII DCRLAQGTDD QCK------- ---------- 257
CYP76L1   LVRDTVEEAT KPNLSDLFPV LAALD--LQG RRRRTAVHIR KFHDFFDEII SRR------- ---------Q NAGGEGERKE 278
CYP76C2   TVIGVMEAVG NPDAANFFPF LGFLD--LQG NRKTLKACSE RLFKVFRGFI DAKLAEKSLR ---------- DTNSKDVRER 280
CYP701A6  TVTDMMMCAI EVDWRDFFPV LSWVPN--KS FETRVFTTET RRTAVMRALI KQQKERIV-- ---------- ----RGEAKT 285

                    340             360             380             400
                     |               |               |               |
CYP71Z3   --LDVLLRLQ KE--GDTPIP ITMELIVMLL FDIVSGGTET STIVLNWTMA ELIRTPRVMT KAHAEVRQTF QAKSTIT-ED 358
CYP71Z4   --LDVLLRLQ KD--GNTPIP ITNEVIVVLL FDMFSGGSET SSSTLIWTMA ELIRKPKVMA KAHVEVRQAF QGKNTIT-ED 359
CYP71Z8   --LDVLLRLQ KE--GDTPIP ITNETMMLLL HNMFSAGSET SSTTLNWTMA ELIKSPRVMA KVHDEVRQAF QGKNTIT--D 359
CYP71Z6   --LDVLLRLQ KE--GGTPVP VTDEIIVVLL FDMISGASET SPTVLIWTLA ELMRNPRIMA KAQAEVRQAV AGKTTIT-ED 356
CYP71Z7   --LDVLLRLQ KE--GGTPVP VTDEIIVVLL FDMFTGASET SPTVLIWILA ELMRCPRVMA KAQAEVRQAA VGKTRIT-EN 355
CYP71Z5   --LSVLLGLQ KE--GGTPIP ITNEIIVVLL FDMFSGGSET SATVMIWIMA ELIRWPRVMT KVQAEVRQAL QGKVTVT-ED 353
CYP71Z1   CSLDDLLRLQ KE--GGSPIP ITNEVIVLL MDMFAGGTDT SSTTLAWMA ELIRSPRVMA KVQSEMRQIF DGKNTIT-ED 344
CYP71Z2   -SLDDVLLRLQ KE--GGTPIP ITNQVITVLL WDMFGAGTDT SSTTLIWTMA ELMRSPRVMA KVQAEMRQAF QGKNTIT-ED 358
CYP71W1   DLLSVLLRLQ RS--GGLKFA LTTEIISTVI FDIFSAGSET SSTTLDWTMS ELMKNPRILR KAQSEVRETF KGGDKLT-ED 351
CYP99A2   SLVNVLLRIR DQ--GDLEFP FGTTNIKAII LDMFTGGTET TSSAAEWVMS ELMRNPEVMA KVQAEVRRVF DNKSPQD-HE 346
CYP99A3   SLVNVLLRIK DQ--GELDFP FSSTHVKAII LDMFTGGTET TSSTTEWLMS ELMRNPEVMA KVQAEVRGVF DNKSPQD-HE 341
CYP71B13  DIVDLLLKVE RGEIGLGEFQ FTRNHTKGIL LDILLAGVDT SGHTITWVMT HLIKNPRVMK KAQAEVREVI KNKDNIT-EE 340
CYP76M2   DFLDSLLGLM S--YG----K IARDDVTTIM FDVFGAGTDT IAITVQWAMA ELLRNPSIMA KARTEMEDVL AGKK--TIEE 341
CYP76M10  DFLDSLLELM S--AG----K IACDDVTTVM FDAFGAGTDT ISNTVWAMA ELLRNPSIMA KVRAEMEDVL AGKK--TIEE 345
CYP76M5   DFLDALLDLV S--EG----K MARDHVTTML FEVFGAGSDT MSVSLEWAMA ELLRNPRAMR KARAELEDAA A-----VVEE 343
CYP76M9   DFLDVLLELM S--TG----K IAREYLTNIL FDVFTAGSDT MSLTVVWAMA ELLRNPGVMA KARAEIDAAL GGRE--AVEE 343
CYP76M6   DFLDALISLA S--AG----K IPRYHITYLL FDVFAAGADT MTTTVEWAMA ELLRNPRVMA KVRAEVTDAL GGRE--SFDE 348
CYP76M1   DFLDSLLDLV S--TG----K IVRENVTTIL LDVFIAGSDT ITATVEWAMA ELLRNPSEMA KVRAEMDGAL GGKK--TVDE 340
CYP76M7   DFLDSLLELM A--TG----K MERVNVVNML FEAFVAGVDT MALTLEWVMA ELLHNPAIMA RVRAELSDVL GGKE--AVEE 341
CYP76M8   DFLDSILELM A--AG----K IDRVNVLNML FEAFVAGADT MALTLEWVMA ELLKNPSVMA KARAELRDVL GDKE--IVEE 342
CYP71M14  DFLDALLELM V--TG----K MERDDVTAML FEAFVAGGDT VAFTLEWVMA DLLRNPPVMA KLRAELDDVL GGKDQSAIEE 364
CYP76M13  DVLDSLLVLM S--TG----K LSRRDVKILL FDILAAGTET TKITVEWAMA ELLRNPNVMA TTRAEMKAAL GGN--GTITE 329
CYP76L1   DFLDVLLQLH S--AD----Q LSLDTIKTFL GDLFTAGTDT NSITVEWAMA ELLRHPAAMS RARAELRDAL GAKPHP--DE 350
CYP76C2   DFVDVLLDLT EGDEA----E LNTNDIVHLL LDLFGAGTDT NSSTVEWAMA ELLRNPETMV KAQAEIDCVI GQK--GVVEE 354
CYP701A6  CYLDFLLAEN T--------- LTDEQLMMLV WEALIEAADT TLVTTEWAMY ELAKNPDKQE RLYQEIREVC GDE---TVTE 353

                    420             440             460             480
                     |               |               |               |
CYP71Z3   DDISGLTYLK MVIKESLRMH CPVPLLGPRR CRET-CKVMG YDILKDTTVF VNAWAMCRSS IYWNDAEEFK PERFENKC-- 435
CYP71Z4   DGVNELTYLK MVIKESLRMH CPVPLLGPRK CRET-CKVMG YDIPKDTTVF VNAWAICRDP KYWDDAEEFQ PERFENKS-- 436
CYP71Z8   DDVAKLSYLK MVTKESLRMH CPVPLLGPRR CRET-CKVMG YDVPKGTIVF VNAWAICRDS KYWKSAEEFK PERFENIS-- 436
CYP71Z6   D-IVGLSYLK MVIKETLRLH PPAPLLNPRK CRET-SQVMG YDIPKGTSVF VNMWAICRDP RYWEDPEEYK PERFENNS-- 432
CYP71Z7   D-IVGLSYLK MVIKEALRLH SPAPLLNPRK CRET-TQVMG YDIPKGTSVF VNMWAICRDP NYWEDPEEFK PERFENNC-- 431
CYP71Z5   D-IVRLNYLK MVIKETLRLH CPGPLLVPHR CRET-CKVMG YDVLKGTCVF VNVWALGRDP KYWEDPEEFM PERFENSD-- 429
CYP71Z1   D-LVQLSYLK MVIKETLRLH CPLPLLAPRK CRET-CKIMG YDVPKGTSAF VNVWAICRDS KYWEDAEEFK PERFENND-- 420
CYP71Z2   D-LAQLSYLK MVLKESFRLH CPVPLLSPRK CRET-CKIMG YDVPKGTSVF VNVWAICRDS MYWKNAEEFK PERFEDND-- 434
CYP71W1   D-VAKLSYLQ LVIKETLRLH PPAPLLIPRE CRET-CQVMG YDVPKGTKVF VNVWKIGREG EYWGDGEIFR PERFENST-- 427
CYP99A2   GLIDNLRYMK MVIKETMRLN PVLPLLMPHL CRET-CDIGG YEVVEGTRVV INSWAMARSP EYWDDAEEFK PERFEDGM-- 423
CYP99A3   GLLENLSYMK LVIKETMRLN PVLPLLLPHL CRET-CEIGG YEIVEGTRVL INSWAMARSP EYWDDAEKFI PERFEDGT-- 418
CYP71B13  D-IEGLEYLK MVVKETLRIN PLVPLLTPRE ASKD-VKIGG YNIPKKTWIH VNIWAIHRNP NVWKDPEAFI PERFMDNQ-- 416
CYP76M2   NDTEKLPYLR AVIKEAMRLH PVAPILLPHQ AAEDGVEIGG YAVPKGSTVI FNVWAIMRDP TAWERPDEFM PERFLQR--- 418
CYP76M10  NDTEKLPYLR AVIKEAMRLH PVAPILLPHR AAEDGVEIGG YAVPKGSTVI FNVWTIMRDP AAWERPEEFM PERFLQR--- 422
CYP76M5   SDAARLPYLA AVVKEAMRLH PVGPILLPHR AVEDGVEIGG YAVPRGAMVI FNAWAIMRDP AAWERPDEFV PERFMET--- 420
CYP76M9   ADVARMPYVQ AVLKEAMRLH PVAPVMLPRK AAEDGVEIGG FEVPRGCAVI FNTWAIMRDP AAWERPDEFV PERFVGRSRA 423
CYP76M6   GDAASLTYLQ CVFKEAMRLH PVGSILVPHL AVQDGVEIGG YAVPKGTTVI FNAWAIMRDP AAWESPDQFL PERFLHKEES 428
CYP76M1   PDIARLPYLQ AVVKEAMRLH PAAPLLLPHR AVEDGVEVGG YCVPKGSMVI FNVWAIMRDP AAWERPEEFM PERFIRRGDD 420
CYP76M7   ADAARLPYLQ AVLKEAMRLH PVGALLLPHF AAEDGVEIGG YAVPRGSTVL FNAWAIMRDP AAWERPDEFV PERFLGRS-- 419
CYP76M8   ADAARLPYLQ AVLKEAMRLH PVGALLLPHF AMEDGVEVGG YAVPKGSTVL FNAWAIMRDA AAWERPDEFV PERFVERT-- 420
CYP71M14  HDAGRLPYLQ AVLKESMRLH SVGPLL-HHF AVLKVGGVGG YAVPRGATVL FNTRAIMRDP AAWERPEEFA PERFLARE-- 441
CYP76M13  ADVVNLPYLQ AAVKESMRLH PVAPLLLPHL VVEDGVRIGG YAVSKGTTVI FNSWAIMRDS TAWERPDDFL PDRFLGKTE- 408
CYP76L1   SDIGRLPYLS AVVMETMRLH PPSPLLMPHE AVADGAAVGG YAVPRGTKVI VNVWSIMRDP ASWPRPEEFE PERFVAAGG- 429
CYP76C2   SDISALPYLQ AVVKETFRLH PAAPLLVPRK AESD-VEVLG FMVPKDTQVF VNVWAIGRDP NVWENSSRFK PERFLGKD-- 431
CYP701A6  EHLPRLPYLN AVFHETLRRH SPVPLIPPRF VHED-TKLAG YDVPAGTEMV VNLYGCNMNR KEWESPEEWV PERFAGGR-- 430
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                          500                 520                 540                 560
                          |                   |                   |                   |
CYP71Z3   ----IDYKGS  NF-EFIPFGS  GRRMCAGMNL  GMADVEFPLA  SLLYHFDWKL  PDGMSPEDID  MQEAPGLFGG  RRTSLILCPI  510
CYP71Z4   ----IDFKGS  NF-EFLPFGS  GRRMCAAMNL  GIANVELPLA  SLLYHFDWKL  PDGMMPEDVD  MQDAPGILVG  KRSSLIMCPV  511
CYP71Z8   ----IDYNGN  NF-EFLPFGS  GRRICPGITL  GMANVEFPLA  SLLYHFDWKL  PNQMEPEEID  MREAPGLVGP  KRTSLYLHPV  511
CYP71Z6   ----VDYKGN  NF-EFLPFGS  GRRICPGINL  GVANLELPLA  SLLYHFDWKL  PNGMAPKDLD  MHETSGMVAA  KLITLNICPI  507
CYP71Z7   ----VDFKGN  NF-EFLPFGS  GRRICPGINL  GLANLELALA  SLLYHFDWKL  PNGMLPKDLD  MQETPGIVAA  KLTTLNMCPV  506
CYP71Z5   ----MDYKGN  TF-EYLPFGS  GRRICPGINL  GIANIELPLA  SLLYHFDWKL  PDEMASKDLD  MQEAPGMVAA  KLTSLCVCPI  504
CYP71Z1   ----IEFKGS  NF-EFLPFGS  GRRVCPGINL  GLANMEFALA  NLLYHFDWKL  PNGMLHKDLD  MREAPGLLVY  KHTSLNVCPV  495
CYP71Z2   ----IELKGS  NF-KFLPFGS  GRRICPGINL  GWANMEFALA  NLLYHFDWNL  PDGMLHKDLD  MQESPGLVAA  KCSDLNVCPV  509
CYP71W1   ----VDFRGA  DF-EFIPFGA  GRRMCPGIAL  GLANMELALA  SLLYHFDWEL  PDGIKSEELD  MTEVFGITVR  RKSKLWLHAI  502
CYP99A2   ----ADYKGS  RF-EYLPFGT  GRRRCPGDTF  GMVLLELIVA  RLLYYFDWSL  PAGMQPDDVD  MDFVVTATTR  RKNHLQLVAS  498
CYP99A3   ----ADFKGS  RF-EYLPFGT  GRRRCPGDIF  AMATLELIVA  RLLYYFDWSL  PDGMQPGDID  MELVVGATAR  RKNHLQLVAS  493
CYP71B13  ----IDYKGL  NF-ELLPFGS  GRRICPGIGM  GMALIHLTLI  NLLYRFDWKL  PEGMEVEDVD  LEESYGLVCP  KKVPLELIPV  491
CYP76M2   AE--VDFRGK  DF-EFMPFGA  GRRLCPGLPM  AERVVPFILA  SLLHAFEWRL  PDGMSAEELD  VSEKFTTANV  L--TVPLKAV  493
CYP76M10  AE--VDFRGK  DF-EFIPFGA  GRRLCPGLPM  TERVVPFILA  SLLHAFEWRL  PVGVAAETLD  LSEKFTTVNV  L--VTPLKAI  497
CYP76M5   TTA-IDFRGK  EY-EYLPFGS  GRRLCPGLPL  AERVVPFVLA  SLLRAFEWRL  PDGVSAEDLD  VSERFNTANV  L--AVPLKVV  496
CYP76M9   TEE-MDFRGK  DF-GFLPFGS  GRRLCPGVPM  AERVLPLIMA  SLLHAFEWRL  PDGMSAEQLD  VSEKFTTANV  L--AVPLKAV  499
CYP76M6   SSPPLELRGK  DY-EYIPFGS  GRRLCPGLPL  AERAVPFILA  SLLHAFEWRL  PDGMSPDDMD  MTEKFATANV  L--ATPLKAV  505
CYP76M1   DE--VDFWGK  TF-EFIPFGS  GRRVCAGLPM  AERVVPFMLA  SLLRAFEWRL  PDGVSAEELD  MRHRFTIANF  R--AIPLKAV  495
CYP76M7   --PPLDFRGK  DV-EFMPFGS  GRRLCPGLPL  AERVVPFILA  SMLHTFEWKL  PGGMTAEDVD  VSEKFKSANV  L--AVPLKAV  494
CYP76M8   --PQLDFRGK  DV-EFMPFGS  GRRLCPGLPL  AERVVPFILA  SMLHTFEWEL  PGGMTAEELD  VSEKFKTANV  L--AVPLKAV  495
CYP71M14  GKAPVDFRGK  EA-DFIPFGS  GRRLCPGIPL  AERVMPYILA  LMLREFEWRL  PDGVSPEELD  VSEKFMSVNV  L--AVPLKAV  518
CYP76M13  ----LDLWGK  QA-KFIPLGS  GRRLCPALPM  VELVVPFTVA  SLLHAFEWHL  PKGMSAEEVD  VTERYTSNDI  LVMATPLKAV  483
CYP76L1   -----SFRGG  EMLEFMPFGA  GRRACPGTPM  ATRVVTLVLA  SLLHAFEWRL  PGGMRPCDVD  VRGRFGTS--  LNMVTPLKAV  502
CYP76C2   ----IDLRGR  DY-ELTPFGA  GRRICPGLPL  AVKTVPLMLA  SLLYSFDWKL  PNGVGSEDLD  MDETFGLT--  LHKTNPLHAV  504
CYP701A6  ------LEVA  DMYKTMAFGA  GRRACAGSLQ  ATHIACAAVA  RFVQEFGWRL  REG-DEEKVD  --------TV  QLTAYKLHPL  495


CYP71Z3   TRVAPSDLQV  IV-  522
CYP71Z4   TRVAPSNPQV  IAS  524
CYP71Z8   TRVAPSSV--  ---  519
CYP71Z6   THIAPSSA--  ---  515
CYP71Z7   TQIAPSSAED  AS-  518
CYP71Z5   TRVAPLISA-  ---  513
CYP71Z1   THIASSCA--  ---  503
CYP71Z2   THISSSCA--  ---  517
CYP71W1   PRVPYISTY-  ---  511
CYP99A2   PYKLAPIQI-  ---  507
CYP99A3   PYKPISMQS-  ---  502
CYP71B13  L---------  ---  492
CYP76M2   PILASSASEL  QAS  506
CYP76M10  PILASHQI--  ---  505
CYP76M5   PVIVN-----  ---  501
CYP76M9   PVVIAC----  ---  505
CYP76M6   PVASHTS---  ---  512
CYP76M1   PVVVS-----  ---  500
CYP76M7   PVLIK-----  ---  499
CYP76M8   PVLIK-----  ---  500
CYP71M14  PVKVIN----  ---  524
CYP76M13  PLIVT-----  ---  488
CYP76L1   PVPVPARP--  ---  510
CYP76C2   PVKKRGRN--  ---  512
CYP701A6  HVHLTRRGRM  ---  505
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